UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY
RESPONSE

Sept. 17, 2008

MEMORANDUM

SUBJECT: Revised Superfund Removal Action Levels

FROM: Deborah Y. Dietrich, Director /s/
Office of Emergency Management

TO: Regional Superfund Division Directors
Regional Removal Managers

Introduction

It has been a central feature of EPA's Superfund program philosophy to integrate the removal and remedial programs in order to achieve the greatest human health and environmental protection in the most efficient fashion. The increased use of removal authority has been highly effective in accelerating the pace of cleanups and has contributed substantially to the number of projects reaching construction completion. The integration of the removal and remedial programs includes the use of common triggers for initiating action.

A variety of tools are available to On-Scene Coordinators (OSCs) and other site managers to determine the need for a removal action at a particular site. One of the key resources for deciding whether to provide alternate drinking water supplies under Superfund removal authority has been the Removal Action Levels (RALs), which were established in Office of Solid Waste and Emergency Response (OSWER) Directive 9360.101, *Interim Final Guidance on Numeric Removal Action Levels for Contaminated Drinking Water Sites* (October 1987).

RALs are chemical-specific concentrations for individual contaminants that may be used to support the decision for EPA to undertake a removal action. Chemical-specific RALs are from two general sources: (1) concentrations based on potential Applicable or Relevant and Appropriate Requirements (ARARs), and (2) concentrations based on risk assessment. ARARs include concentration limits set by environmental regulations, such as Safe Drinking Water Act maximum contaminant levels (MCLs). The second source for RALs, and the focus of this update, is risk-based calculations that generate concentrations using carcinogenic or

systemic toxicity values and standardized exposure assumptions. Although calculated RALs are "risk-based," they are not necessarily protective concentrations; thus, the calculated RALs should not be confused with or used as Preliminary Remediation Goals (PRGs), cleanup levels or cleanup standards. RALs may be used to support the decision to undertake a removal action, but final cleanup levels will be selected to address the site-specific threat.

Objective

The purpose of this memo is to inform OSCs and other site managers of a website and online calculator that were developed as an update to earlier RAL guidance. The most recent list of RALs was published in 1998, and is outdated due to changes in Agency toxicity criteria and Superfund risk methodologies. Previously, RALs were provided only for drinking water. This update provides RALs for air, drinking water and soil, and is more in line with the Federal Superfund program's risk assessment and risk management practices.

The updated RALs, were drafted by a workgroup comprised of staff from the Office of Emergency Management (OEM), the Office of Superfund Remediation and Technology Innovation (OSRTI), and Regional representatives including Removal Managers, On Scene Coordinators and risk assessors (see attached list). Following the Agency's "Good Guidance" initiative, OSWER requested and received substantive comments on the RAL website and online calculator from other EPA offices including the Office of Research and Development, the Office of Water, and the Office of Environmental Information Quality (OEI). The RAL website and online calculator were also reviewed by the Agency for Toxic Substances and Disease Registry and the Office of Management and Budget (OMB).

In consultation with OEI, OSWER has decided to follow a "continuous improvement" model in further developing and refining the RAL guidance. Thus, OSWER intends to release this website and online calculator only for internal EPA use, as we gather feedback from our Regional users. We ask that you provide feedback on the guidance and website using the "Comment Forum" link provided at the top of the webpage. We will review this feedback on a quarterly basis, and further refine the guidance, as appropriate, following the model suggested by OEI.

The RAL website is available at: https://epa-rals.ornl.gov/. Questions can be directed to Janine Dinan of my staff at dinan.janine@epa.gov or by calling 202-564-8737.

Attachment 1

Removal Action Level Workgroup Representatives

OEM: Janine Dinan

OSRTI: David Cooper and Dave Crawford

OEM OSC Task Force: Robert J. Kelly

Removal Manager: Jim McGuire

Regional Technical Workgroup:

Region 2 - Chloe Metz, Mark Maddaloni, Akhil Verma

Region 3 - Jennifer Hubbard

Region 4 -Glenn Adams, Kevin Koporec

Region 5 - Afif Marouf

Region 7 -Michael Beringer, Dave Williams

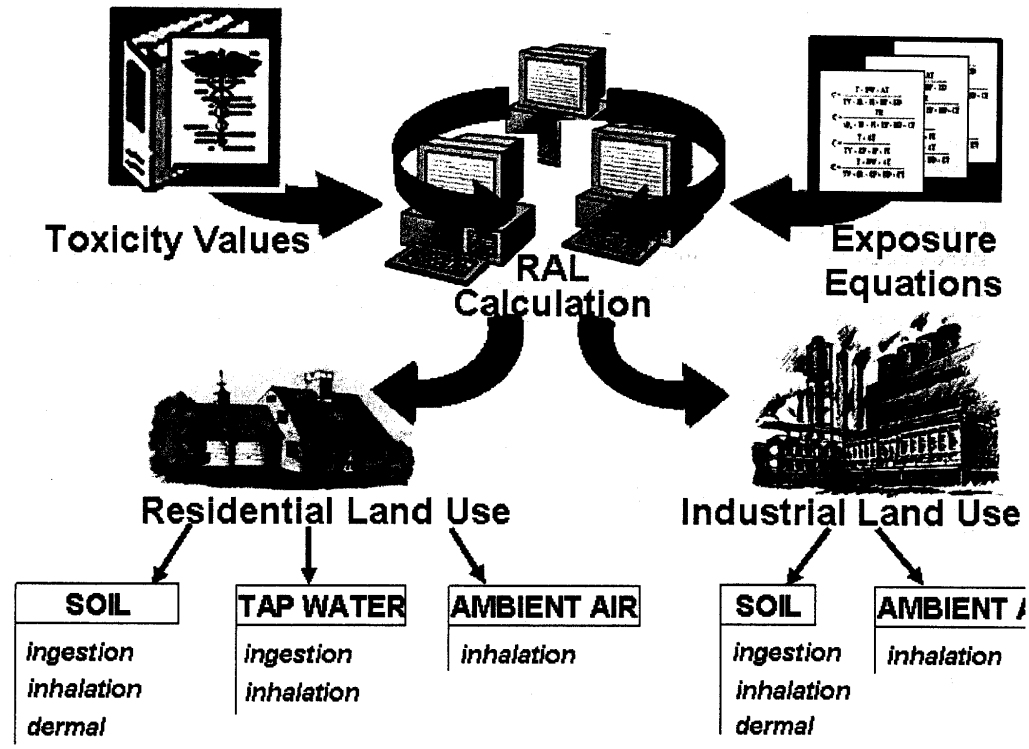
Region 8 - Susan Griffin

Region 9 -Hedy Salter

https://epa-rals.ornl.gov/

Emergency Response Program Last updated on Friday, September 26th, 2008.

Removal Action Levels for Chemicals (RALs)



Welcome

Welcome to the EPA's chemical Removal Action Level (RAL) download and calculation website. The purpose of this database is to provide an RAL calculation tool to assist On Scene Coordinators (OSC's), and others involved in decision-making concerning CERCLA removal actions at hazardous waste sites.

Here you will find generic, risk-based RALs calculated using the latest toxicity values and exposure assumptions used by EPA's Superfund program. In addition, the input parameters in the generic RAL equations may be modified to create site-specific RALs that meet the needs and conditions of your site. To ensure proper application of the RALs, please check out the What's New, Frequently Asked Questions, Generic RAL Tables, and RAL Calculator links.

Introduction

The increased use of removal authority has been highly effective in accelerating the pace of cleanups and has contributed substantially to the number of projects reaching construction completion. The integration of the removal and remedial programs includes the use of related triggers for initiating action and common goals for site cleanup.

The Removal Action Levels (RALs) presented on this site are chemical-specific concentrations for individual contaminants in air, drinking water and soil that may be used to support the decision for EPA to undertake a removal action. Although calculated RALs are "risk-based," they are not necessarily protective concentrations; thus, the calculated RALs should not be confused with or used as Preliminary Remediation Goals (PRGs), cleanup levels or cleanup standards required by the Applicable or Relevant and Appropriate Requirements (ARARs) under CERCLA. RALs may be used to support the decision to undertake a removal action, but final cleanup levels will be selected to address the site-specific threat.

Risk-based RALs are derived from calculations using carcinogenic or systemic toxicity values and standardized exposure assumptions used by EPA's Superfund program. The RALs and methodology presented on this website will serve as an update to previous lists of RALs provided by EPA. The most recent list of RALs was published in 1998, and is outdated due to changes in Agency toxicity criteria and risk methodologies.

Previously, RALs were provided only for drinking water. This update provides RALs for air, drinking water and soil, and is more in line with the Federal Superfund program's risk assessment and risk management practices.

Methodology

The RAL calculation tool uses toxicity values from the Superfund program's hierarchy and exposure information to calculate risk-based RALs, and is based on the methods outlined in EPA's Risk Assessment Guidance for Superfund, Part B Manual (1991) and Soil Screening Guidance documents (1996 and 2002).

This database presents "generic" risk-based RALs and allows for the calculation of "site-specific" risk-based RALs for individual chemical contaminants.

Generic RALs are based on default exposure parameters and factors that represent Reasonable Maximum Exposure (RME) conditions for long-term/chronic exposures. Generic RALs are provided for air, drinking water and soil in a residential or industrial setting.

The target risk levels for calculating generic RALs, are an extension of the Superfund program's "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" (OSWER Directive

9355.0-30) guidance which states:

> "Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4} and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted unless there are adverse environmental impacts. However, if Maximum Contaminant Levels (MCLs) or non-zero Maximum Contaminant Level Goals (MCLGs) are exceeded, action generally is warranted."

Generally, exceeding an MCL in a drinking water supply may constitute a potential threat to human health and may indicate that a removal action is appropriate. Therefore, in cases where a chemical has a corresponding MCL, the RAL typically will defer to the promulgated standard and Regions generally should use the MCL as the default RAL.

In the absence of promulgated standards, risk-based methods are commonly used to determine the need for a response action. The 1991 guidance cited above describes conditions at a site where action generally is not warranted. As such, the associated risk levels correspond to a ***cumulative site risk*** less than 10^{-4} for exposure to ***multiple*** chemicals with potential carcinogenic effects and a Hazard Quotient (HQ) less than 1 for those chemicals with potential non-carcinogenic toxicity. Since RALs will be used to support the decision to undertake a removal action at a site, they correspond to higher risk levels and do not address cumulative risk.

Once again, calculated RALs are not meant to define protective levels and are not de facto cleanup levels. Thus, generic RALs correspond to risk levels of 10^{-4} and/or a Hazard Quotient of up to 3 for long-term exposure to ***individual*** chemicals at a site. A 10^{-4} risk level corresponds to the upper-end of EPA's generally acceptable risk range of 10^{-6} to 10^{-4} as discussed in the National Contingency Plan (NCP), 40 CFR 300.430. Unlike the carcinogenic risk range, there is no recommended range for non-carcinogenic risks. However, an HQ of 3 is generally considered a reasonable risk level for RALs for non-carcinogenic chemicals based on the discussion of uncertainty included in EPA's definition of the non-carcinogenic Reference Dose (RfD) and Reference Concentration (RfC). EPA defines the RfD and RfC as:

> "...an estimate (with uncertainty spanning perhaps an order of magnitude) of daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime..."

Given the order of magnitude uncertainty surrounding the RfD and RfC, and the fact that RALs are not meant to define protective levels, generic RALs calculated using EPA's RfDs and RfCs correspond to an HQ of 3. As a science policy choice, OSWER selected an HQ of 3 as the target risk level for the noncancer RALs to distinguish the values from cleanup levels commonly set at an HQ of 1. Calculated RALs are set at a higher risk level because they are not meant as cleanup levels; instead, RALs support the need for a removal action. Although the target risk for the noncancer RAL should be greater than an HQ of 1, it should still lie within the order of magnitude uncertainty surrounding the RfD/RfC (by definition). In other words, the RfD/RfC can be thought of as falling in the middle of a factor of ten uncertainty range; with a factor of three above and below (i.e., 0.3 to 3). By setting the RAL target risk level for the noncancer RALs at an HQ of 3, EPA is utilizing the upper-end of the uncertainty surrounding the RfD/RfC. Please note that there may be site-specific circumstances where an HQ less than 3 may be more appropriate for calculating RALs. For example, a site may

have multiple chemicals with RfDs and RfCs based on the same toxic endpoint, or conditions at a site may warrant RALs based on shorter exposure durations and the use of toxicity criteria other than RfDs and RfCs.

In addition to providing the user with a table of generic, risk-based RALs, this calculation tool allows users to modify the standardized, default parameters to calculate site-specific RALs. For example, a risk assessor may want to calculate RALs based on short-term exposures. In this case, the assessor would use an equation where the 25 or 30-year default value for exposure duration was reduced and also replace the toxicity criteria and risk levels used for chronic exposures with values that are appropriate for the exposure duration and toxicity criteria selected.

Whether this database tool is used to retrieve a list of generic RALs or to calculate site-specific RALs, it is important to clearly demonstrate the equations and exposure parameters used in deriving RALs at a site. A discussion of the assumptions used in the RAL calculations should be included in the decision document where the RALs are presented.

Comparison of site concentrations to RALs is only one factor used in determining the need for a removal action at a site. While EPA's expectation is that removal actions are generally justifiable above the RAL, EPA has the flexibility to determine that case-specific conditions do not warrant a removal action. For example, site-specific background or exposure scenarios might indicate that a removal is not necessary, or that another mechanism for addressing the site is more appropriate. In such cases, EPA might refer the site for remedial action, or to a state or other authority, or might choose some other means of dealing with the site. Conversely, this calculation tool cannot account for all chemicals, exposure pathways or receptors that may be present at a site. Thus, a significant health threat may exist at a site even if none of the substances detected exceeds its numeric RAL. Site-specific flexibility exists to consider: site-specific exposures, past exposures (if known), exposures from other sources, exposures to multiple contaminants, population sensitivity, and other factors not directly related to the contamination. Therefore, a removal action may be initiated if the health risk at a site has been analyzed in detail and the analysis indicates that a serious risk is present due to site-specific factors.

Note: Radionuclide RALs are not provided or addressed in this calculator.

Note: No consideration is given to ecological effects in the values presented in this database tool. Therefore, ecological risk may need to be addressed separately when a removal action based on these RALs is being considered.

back to top

This site is maintained and operated through an Interagency Agreement between the EPA Office of Superfund and Oak Ridge National Laboratory. For questions or comments please contact Janine Dinan at the Office of Emergency Management.

Yes. While EPA's expectation is that removal actions are generally justifiable above the RAL, EPA has the flexibility to determine that case-specific conditions do not warrant a removal action. For example, site-specific background or exposure scenarios might indicate that a removal is not necessary, or that another mechanism for addressing the site is more appropriate. In such cases, EPA might refer the site for remedial action, or to a state or other authority, or might choose some other means of dealing with the site.

9. **How often do you update the RAL Table?**

The RAL database is updated when new toxicity or exposure values are presented by the EPA. This is generally done monthly; however, there may be times when more than one month passes without the release of updated toxicity values. Please take note of the "What's New" page to identify when toxicity or exposure values have been updated.

10. **Can I get a copy of a previous RAL table?**

We do not distribute outdated copies of the RAL table. Each new version of the table supersedes all previous versions. If you wish to maintain previous versions of the RALs for a long-term project, you can download the entire table and save multiple versions with a time-stamp. If RALs have been used in the decision to undertake a removal action, it is generally advisable that the administrative record for that decision contain documentation of the RALs used (e.g., a time-stamped copy of the RALs calculated).

11. **Why doesn't the calculator include asbestos and dioxins?**

There are no national default numbers available for asbestos concentrations in soil. Thus, the need for a removal action can only be determined on a site-specific basis. OSWER's Asbestos Technical Review Workgroup is currently developing guidance for investigating and evaluating asbestos risk at sites.

For dioxins, OSWER policy states that 1 ppb (TEQs) should generally be used as a starting point for residential soil cleanup levels for CERCLA non-time critical removal sites (time permitting, for emergency and time critical sites) and a level within the range of 5 ppb to 20 ppb (TEQs) should generally be used as a starting point for cleanup levels at CERCLA non-time critical removal sites (time permitting, for emergency and time critical sites) for commercial/industrial soil.

back to top

This site is maintained and operated through an Interagency Agreement between the EPA Office of Superfund and Oak Ridge National Laboratory. For questions or comments please contact Janine Dinan at the Office of Emergency Management.

https://epa-rals.ornl.gov/cgi-bin/RAL_search
Last updated on Friday, September 26th, 2008.

Emergency Response Program

Removal Action Levels for Chemicals (RALs)

RAL Calculations

Select Scenario.

◉ Residential
○ Industrial Worker

Select RAL Type.

◉ Default RALs
○ Site Specific RALs

Select Chemicals.
Select one or more chemicals for the screening.

To select more than one chemical you can:

1) left click and hold the button down while dragging the mouse pointer up and down through the chemical list,
2) hold the control (Ctrl) key down while left clicking on the chemicals desired or
3) click in the "Select All" box to the bottom right of the chemical list.

ALAR
Acenaphthene
Acephate
Acetaldehyde
Acetochlor
Acetone
Acetone Cyanohydrin
Acetonitrile
Acetophenone

☐ Select All

Select one of the following output options

- (●) View on Screen
- ( ) Tab delimited file

Select one of the following selection criteria

- (●) RALS and toxicity values only
- ( ) RALS with route-specific components and toxicity values only (wide)
- ( ) With toxicity references (wider)
- ( ) With supporting inputs

clear selection NEXT

back to top

This site is maintained and operated through an Interagency Agreement between the EPA Office of Superfund and Oak Ridge National Laboratory. For questions or comments please contact Janine Dinan at the Office of Emergency Management.